

Appl. No. : 10/816,340
Filed : March 31, 2004

SUMMARY OF INTERVIEW

Identification of Claims Discussed

31.

Identification of Prior Art Discussed

U.S. Patent No. 5,816,900 to Nagahara et al. ("Nagahara '900").

Proposed Amendments

Proposed Amendments to capture the sequence of bowing relative to movement of the wafer were discussed.

Principle Arguments and Other Matters

Applicants' representative, Mr. Adeel S. Akhtar, noted that Nagahara '900 does not teach bowing a pad as the pad and wafer are being relatively moved into contact.

Results of the Interview

The Examiner agreed to consider Applicants' amendments to the claims.

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REMARKS

Reconsideration and allowance of this application is respectfully requested. Claims 31-38 were pending prior to entry of the amendments herein. Claim 31 has been amended to clarify the invention. No new matter is added by this amendment.

Applicants submit that this application, as amended, is in condition for allowance and such action is earnestly requested. The Examiner's reason for rejection is addressed below.

Amendments to the claims

Claim 31 has been amended to recite "a control system programmed to control pressure to ensure bowing the pad while relatively moving the conductive face of the wafer and the pad into contact." This amendment is fully supported by the application as originally filed, now U.S. Patent Publication No. 2004/0266193, at, for example, paragraphs [0052] and [0058]. To illustrate support for this amendment, Applicants teach a computer to control bowing of the support plate (pad) by controlling the solution pressure. See, e.g., Fig. 10 and paragraph [0052]. Applicants also clearly teach the sequence recited, namely that the solution pressure is increased to bow the pad when the surface of the wafer and the pad are being relatively moved into contact:

"[W]hen the pressure of the solution 403 is increased to bow the support plate 408 towards the wafer 400 at least during the first stage of process when wafer is being lowered down towards WSID 402, WSID 402 bows and the solution flowing from the WSID 402 also takes a convex shape. This way when the wafer is lowered towards the WSID, the central region of the wafer gets wetted by the process solution first. Because of the convex shape of the WSID, the solution from the top of the convex shape reaches the center of the center of the conductive surface of the wafer and wets the center region before the solution flowing from the rest of the WSID reaches and wets the rest of the surface of the wafer. This way, since the bubbles are swept away from the center, no bubble entrapment occurs." See paragraph [0058].

The skilled artisan will thus readily appreciate from the application as a whole that a computer or control system is programmed to conduct this specifically taught sequence.

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Rejection Under 35 U.S.C. §103

Claims 31, 32, 35, 36, 37 and 38 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,816,900 ("Nagahara '900") or 5,931,719 ("Nagahara '719") to Nagahara et al. (collectively "Nagahara") and in view of U.S. Patent No. 6,004,880 to Liu et al. ("Liu"). The Examiner has found that the Nagahara patents teach an apparatus including a wafer carrier holding a wafer, a chamber having an upper opening and a compressible and flexible pad having a polishing surface, and fluid channels, wherein the pad is placed between the upper opening of the chamber and the wafer (or the face of the wafer), and wherein the pad is configured to bow outward and therefore apply more pressure at the center when a pressure in the chamber increases. The Examiner asserts that "neither Nagahara et al reference teaches using the apparatus for electrochemical mechanical deposition or polishing." However, the Examiner has found that Liu teaches "a method of electrochemical mechanical deposition and simultaneous polishing of semiconductor wafers." The Examiner has further found that Liu's method "has the advantage of being only one step instead of multiple steps of electrochemical deposition followed by mechanical polishing." The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to have adapted the pad of Nagahara et al to be used in an electrochemical mechanical process as disclosed by Liu et al because integration of electrodes in a CMP apparatus allow for one step processing instead of two steps." Final Office Action at pages 2 and 3.

Applicants submit that Claim 31, as amended, is allowable of the combination of Nagahara and Liu. Nagahara is motivated only to alter relative pressure on the wafer at different locations and does not recognize any benefit to be gained from bowing the pad before making contact with the wafer (in contrast to Applicants teaching particular advantages, such as, e.g., removing bubbles from the center region of the wafer, as noted above). The fact that Nagahara fails to teach the recited sequence is clear from Nagahara '900 at Col. 4, lines 61-62, which describes the wafer 12 of Fig. 2 already in contact with the pad 16 prior to any discussion of bowing. Accordingly, the asserted combination does not teach or suggest "a control system programmed to control pressure to ensure bowing the pad while relatively moving the conductive face of the wafer and the pad into contact." Consequently, Applicants respectfully request that the §103 rejection of Claim 31 be withdrawn.

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Claims 32-38 depend from and therefore include all of the limitations of Claim 31, in addition to reciting features of particular advantage and utility. The asserted combination of Nagahara and Liu does not teach or include the limitations of Claim 31, let alone the unique combination of limitations of Claims 32-38. Consequently, Applicants respectfully request that the §103 rejection of Claims 32-38 also be withdrawn.

Conclusion

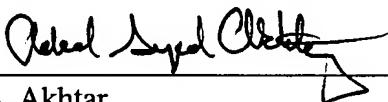
Applicants respectfully submit that all of the pending claims are patentably distinguishable and allowable over the prior art of record. The cited references, either alone or in combination, do not teach or suggest the claimed invention.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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Dated: May 19, 2006

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